

I CLAIM:

1. A method of fabricating a microstructure array, comprising:
 - fabricating a carrier wafer having a plurality of holes therethrough;
 - mounting a structure wafer to the carrier wafer with alignment relative to the plurality of holes in the carrier wafer;
 - 5 etching openings through the structure wafer at locations away from the plurality of holes in the carrier wafer, to form a plurality of rotatable microstructures arranged in an array attached to a frame by gimbal portions and hinges;
 - attaching permanent magnets to the structure wafer at the locations of the holes in the carrier wafer; and
 - 10 then removing the carrier wafer from the structure wafer.
2. The method of claim 1, wherein the microstructures each include a reflective mirror surface.
3. The method of claim 1, wherein the step of fabricating the carrier wafer comprises:
 - mounting the carrier wafer to a support wafer;
 - forming a mask layer over a surface of the carrier wafer;
 - 5 patterning the mask layer to expose the carrier wafer at selected locations;
 - etching through the carrier wafer at the exposed locations to form a plurality of holes; and
 - then releasing the carrier wafer from the support wafer.
4. The method of claim 1, wherein the etching step comprises:
 - forming a mask layer over a surface of the structure wafer;

patterning the mask layer to expose selected locations of the structure wafer;

- 5 etching through the structure wafer at the exposed locations to form the plurality of microstructures, gimbal portions, and hinges.

5. The method of claim 4, wherein the etching step comprises:

exposing the structure wafer to a wet chemical etching agent.

6. The method of claim 4, wherein the etching step comprises:

reactive ion etching the exposed locations of the structure wafer.

7. The method of claim 1, further comprising:

attaching permanent magnets at a surface of the structure wafer at locations opposite the locations of the holes in the carrier wafer.

8. The method of claim 1, further comprising:

prior to the attaching step, plating a surface of the structure wafer with a reflective metal.

9. The method of claim 1, further comprising:

after the removing step, separating the microstructures from the structure wafer.

10. The method of claim 1, wherein each of the microstructures comprises a micromirror having a reflective mirror surface;

and further comprising:

5 after the removing step, mounting the plurality of micromirrors over a coil driver array.

11. A method of fabricating a plurality of hinged structures, comprising:

fabricating a carrier wafer having a plurality of holes therethrough;

mounting a structure wafer to the carrier wafer with alignment relative to the plurality of holes in the carrier wafer;

5 etching openings through the structure wafer at locations away from the plurality of holes in the carrier wafer, to form a plurality of moveable structures monolithically formed in the structure wafer, where each of the plurality of moveable structures are immobilized by the carrier wafer;

10 attaching an actuator to the structure wafer at each location corresponding to one of the plurality of holes in the carrier wafer; and

then removing the carrier wafer from the structure wafer.

12. The method of claim 11, wherein each of the moveable structures includes a reflective mirror surface.

13. The method of claim 11, wherein the step of fabricating the carrier wafer comprises:

mounting the carrier wafer to a support wafer;

forming a mask layer over a surface of the carrier wafer;

5 patterning the mask layer to expose the carrier wafer at selected locations;

etching through the carrier wafer at the exposed locations to form a plurality of holes; and

then releasing the carrier wafer from the support wafer.

14. The method of claim 11, wherein the etching step comprises:

forming a mask layer over a surface of the structure wafer;

patterning the mask layer to expose selected locations of the structure wafer;

5 etching through the structure wafer at the exposed locations to form the plurality of moveable structures.

15. The method of claim 14, wherein the step of etching through the structure comprises:

exposing the structure wafer to a wet chemical etching agent.

16. The method of claim 14, wherein the step of etching through the structure comprises:

reactive ion etching the exposed locations of the structure wafer.

17. The method of claim 11, wherein the attaching step comprises:

attaching a magnet at a surface of the structure wafer at each of a plurality of locations opposite the locations of the holes in the carrier wafer.

18. The method of claim 11, further comprising:

after the removing step, separating the microstructures from the structure wafer.

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